



EAST AFRICAN CRUDE OIL PIPELINE



UGANDA

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

NON-TECHNICAL SUMMARY

Submitted for approval to:
National Environment Management Authority

By:
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INTRODUCTION

The East African Crude Oil Pipeline (EACOP) will transport oil from the delivery point in Hoima District, Uganda, to a storage tank facility in Tanga District and a nearby offshore tanker loading platform, on the East African coast of Tanzania.

Potential impacts, positive and negative on the economy, people, and environment in Uganda have been described and assessed for many features considered to be valued and important to society (for example, protection of people’s livelihoods). Measures to avoid or reduce negative impacts are described, and after the measures are applied, the predicted remaining impacts are described.

An environmental impact statement has been prepared based on the:

- Government of Uganda Environmental Impact Assessment Regulations (1998)
- EACOP Scoping Report and terms of reference approved by the National Environment Management Authority dated 19 September 2017.

Project Description

Figure 1 shows the EACOP project in Uganda which includes:

- a 296-kilometre-long, 24-inch-diameter buried pipeline from the future Kabaale Industrial Park, in Hoima District, to Mutukula near the border with Tanzania. The pipeline will be insulated and will have an electrically heated cable on the pipeline to keep the temperature of the oil at 50°C or warmer so the oil will flow in the pipeline.
- aboveground installations which consist of:
 - two stations with pumps (pumping stations) to keep the oil moving through the pipeline from north to south
 - 19 valves at key locations where the oil flow can be reduced or stopped
 - 4 electrical substations, collocated with valves, to power the electrically heated cable
- roads:
 - 6.8 kilometres of new and upgraded permanent access roads
 - 8.3 kilometres of new and upgraded (temporary) roads for getting to construction facilities
- construction facilities:
 - 4 main camps and pipe yards where pipe and equipment will be stored and construction workers housed.

Who is involved?

Shareholders

- Uganda National Oil Corporation
- Tanzania Petroleum Development Corporation

Developers and operators

- Total E&P Uganda BV
- Tullow Uganda Operations Pty Ltd
- CNOOC Uganda Limited

Initial project developer

- Total East Africa Midstream BV



MEASURES TO AVOID OR REDUCE NEGATIVE IMPACTS ARE DESCRIBED, AND AFTER THE MEASURES ARE APPLIED, THE PREDICTED REMAINING IMPACTS ARE DESCRIBED.



FIGURE 1: The EACOP Project

Project Alternatives

Project alternatives have been considered for:

- pipeline routing
- siting construction and operation facilities
- technology
- construction techniques.

Routing

Alternative pipeline routes were identified early in the project development. The routing process began with the identification of a starting point and a flexible end point which was then followed by several studies evaluating constraints such as:

- whether there were landslide and erosion risks
- the number and type of river crossings
- potential impacts on people and the environment

This work finished with the selection of eleven 50-kilometre-wide corridors for more detailed evaluation. Existing information (for example, satellite imagery, maps and reports) was used to assess these corridors. Three options were selected:

- Kenya North
- Kenya South
- Tanzania.

Higher-resolution satellite imagery was then used to refine these routes by analysing the constraints listed above. In April 2016, following this work, the Government of Uganda announced the selection of the Uganda–Tanzania route shown in Figure 1.

Facility Locations

Alternative numbers, locations, layout and footprint of the aboveground installations and construction facilities (including the main camp and pipe yards) have been considered.

The main reason for choosing each site has been to ensure that the facility can do the work it is designed to do.

Aboveground Installations

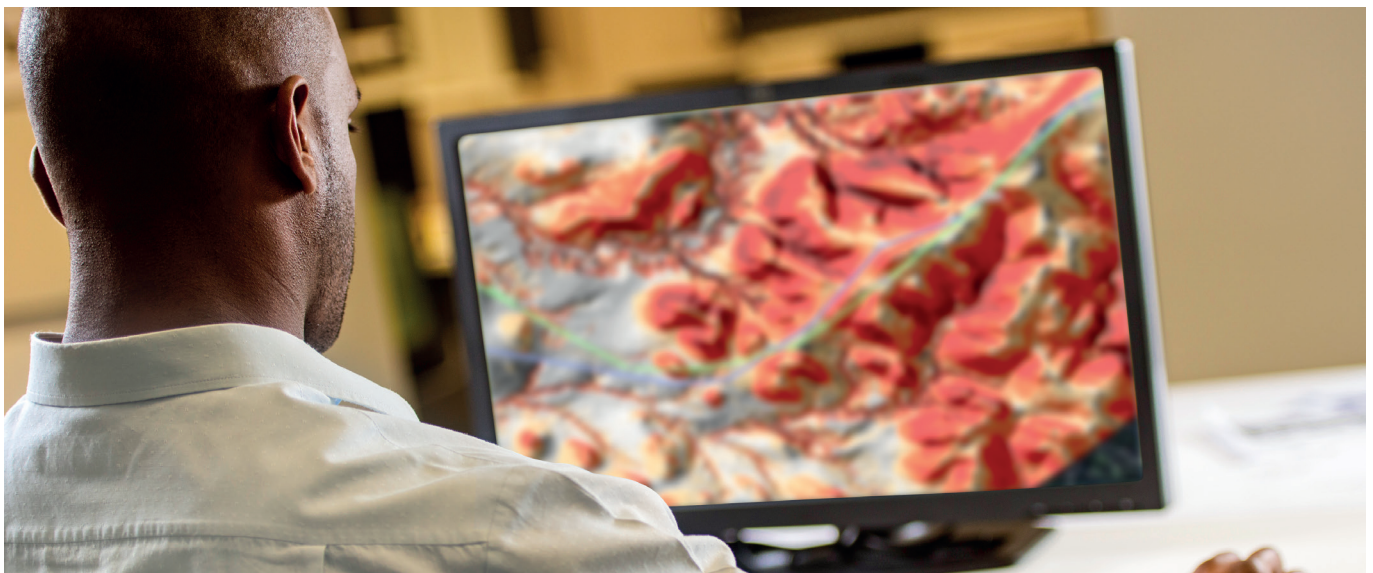
The oil flow requirements in the pipeline provided the basis for the spacing of the pumping stations before the early engineering and design work was done. The following factors were also considered:

- the need to keep the oil at a temperature of 50°C so it can flow
- the need to keep people and the environment safe
- the need to avoid areas important to people and wildlife
- the physical conditions of each site (the features of the land surface and their distance from roads).

Satellite imagery and visits to the sites were used to choose the locations during the early engineering and design work.

The final position of the substations needed for the electrical cable heating system will be chosen following further studies. The sites for the valve stations have been selected based on detailed risk analysis which looked at the potential for a leak from the pipeline and the consequences of such a leak.

SATELLITE IMAGERY AND VISITS TO THE SITES WERE USED TO CHOOSE THE LOCATIONS DURING THE EARLY ENGINEERING AND DESIGN WORK.





A BURIED PIPELINE WAS SELECTED, AS IT OFFERS BETTER SECURITY AND SAFETY

Construction Facilities

Construction facility sites have been selected to:

- minimise the amount of land needed and disruption that using this land may cause
- minimise the distance from roads
- avoid populated and nationally protected areas of value for wildlife
- provide a relatively flat surface.

Technology

Alternatives were considered for:

- the pipeline (different diameters of pipe and wall thickness)
- pumps
- power generation
- insulation
- heating
- oil storage.

Pipeline

A partially aboveground pipeline was considered, but the option was not taken further because of security and safety concerns, the risk of interference by people, and its effects on views and the movement of large animals. A buried pipeline was selected.

Treating the oil to prevent it from gelling during transportation was considered, but insulation and heating to keep it warm was considered to be a better option.

Pumps

The oil characteristics ruled out some types of pumps. Those selected are the most suitable for the task, proven, robust and cost effective.

Power Generation

Several ways of generating electrical power were considered, including using engines powered by crude oil, gas oil or gas; turbines powered by steam and electricity from the power supply network or solar electricity.

Power supply from the Tilenga Central Processing Facility has been selected as the best option. However, the viability of using solar power to supply further power continues to be investigated.

Insulation

Early studies show that to keep the oil warm enough to flow in an uninsulated pipe, 35 oil-powered heating stations would be needed. Building and operating these stations would have led to a greater impact on people and the environment, and higher fuel and costs. The number of heating stations, which will be placed in Uganda, is reduced to two by insulating the pipeline. Insulation will mean a higher initial cost, but less impact on people and the environment, and lower cost over the project's lifetime.

Three types of insulation were considered:

- foam made from a man-made resin (polyurethane)
- glass
- pipe within another pipe.

Polyurethane foam was chosen as the best option, as it gives the best insulation with lowest cost.

Heating

Three ways of keeping the oil hot enough to flow were considered:

- an electrically heated cable on the pipe
- heating the oil at different places along the route
- heated cable and heating the oil (mixed heating).

The mixed heating option was selected based on its efficiency.

Construction Techniques

Several pipeline construction techniques were considered for crossing rivers and roads, including:

- digging of a trench
- drilling a horizontal hole for the pipe
- digging a small tunnel
- boring a hole for the pipe for a short distance.

The digging of a trench is proposed for river crossings. Subsurface crossing techniques will generally be used to avoid disruption to road transportation. The final method for crossing rivers will be selected before construction starts.

Legislative, Policy and Administrative Framework

The environmental and social impact assessment (ESIA) was developed to comply with Ugandan laws, Government policies and plans, and the International Finance Corporation Performance Standards. Project standards (maximum limits) have been developed to control project emissions to air, water, and noise.

The ESIA is being submitted to the National Environment Management Authority.

The pipeline will cross Uganda and Tanzania, and the governments of these countries have signed an agreement to streamline the legal regime for the project.

ESIA Methodology

ESIA Process

The ESIA included several steps:

- early identification (screening) of potential project impacts, mostly through routing studies
- the identification of potentially significant impacts for further detailed assessment (scoping). As part of this work, an area of influence was identified for each environmental or social feature – the largest area that could be affected, for example, for noise from a pumping station, the maximum distance from the station that noise is likely to be heard
- desk-based analysis and surveys (baseline studies) to get enough information to understand the environmental and social conditions
- the identification of potential project impacts and development of measures to reduce and manage these impacts (mitigation). This process has been repeated to ensure that the project adopts the best mitigation measures. The process will continue in future stages of detailed project design and during construction
- bringing together the mitigation and management measures into an environmental and social management plan, and bringing the monitoring measures into an environment and social monitoring plan.

The ESIA and project teams talked to people that may be affected by the project during the ESIA process and their views have been used to develop the project design and understand their perspectives on impacts and measures to reduce the impacts.

Valued Environmental and Social Components

The ESIA focused on the impacts on 'valued environmental and social components' (those features considered to be important by society) and their associated benefits to humans



WOMEN DRAWING A MAP OF THEIR VILLAGE DURING STAKEHOLDER CONSULTATION

(known as 'ecosystem services'). The joint effects from this project and other projects which may be built or operated nearby were also considered.

The sensitivity of each valued environment and social component to the potential project effects has been determined and graded. For some components there are laws that set limits, for example, the level of impurities allowed in air. How close the project will come to these limits has been used to help predict the size or significance of an impact.

Impact Assessment

The ESIA identifies, describes and assesses the potential impacts from the EACOP project on each component.

Normal Operations

The potential project impacts when the project has normal operations were assessed, including:

- project impacts that could happen anywhere on the pipeline route, and those that could happen at a specific location
- project impacts remaining after mitigation added to impacts from other projects
- impacts that could extend across national boundaries.

The significance of the impacts was determined without, and then with, mitigation measures applied. Measures to reduce the impacts were developed continually until, as much as possible, an impact was no longer ranked as significant. Any effects left after mitigation are called residual impacts.

The significance of impacts on the valued environmental and social components was determined by combining the sensitivity of the component and the consequence of the impact, taking into account the:

- level of change that could be caused by the project (magnitude)
- length of time over which an impact could occur (duration)
- area affected by the impact (extent).

The sensitivity, magnitude, duration and extent were given a score and added to give an impact score.

Impacts with scores over a set number were considered significant.

Abnormal or Unplanned Events

The potential project impacts from unplanned event were assessed including:

- earthquakes and landslides
- accidents from road collisions, fire, pipe damage from unauthorised digging and inland oil spills.

The chance of these potential events happening has been estimated.

Environmental and Social Baseline Conditions

The following sections describe the current condition for different environmental and social features in the area of influence (for example, air quality), their trends and sensitivity to change that may be caused by direct or indirect project activities.

Biodiversity

Habitats of Conservation Importance

The project's area of influence is mostly in habitats which have been changed by humans, but with some natural habitats inside and outside areas protected by law. Habitats of conservation importance within the project's area of influence include Guineo-Congolian semi-evergreen forest and riverine and swamp forest (wetland forests). These habitats are highly threatened and unique ecosystems (as defined by the International Finance Corporation). Connected forest habitat within and between Budongo, Bugoma and Wambabya Forest Reserves is also of conservation importance for the habitat itself and owing to the presence of threatened plants and animals such as chimpanzees.

Plants and Animals of Conservation Importance

Ten plants of conservation importance are present in the area of influence. Most of these plants were recorded in swamp and riverine forests, and Guineo-Congolian semi-evergreen forest. One of the plants of conservation importance is listed by the International Union for Conservation of Nature as vulnerable, six are on the Ugandan Red List (with threat categories from vulnerable to critically endangered, and two are classed as Gold Star endemic (native) plants, as defined by the Rapid Botanical Survey. The presence of one Ugandan Red List critically endangered plant and one native plant in the right-of-way requires further verification.

magnitude + duration + extent + feature sensitivity = **impact score**



THE EACOP PROJECT HAS IDENTIFIED AREAS SUCH AS THE WAMBABYA FOREST RESERVE WHICH MAY BE AFFECTED BY THE DEVELOPMENT.

Baseline surveys identified the presence or likely use of the habitat of 13 animals of conservation importance within the area of influence which are nationally and or globally rare and threatened. These include Bohor reedbuck, African golden cat, hippopotamus and spot-necked otter. Chimpanzee inhabit Wambabya and Bugoma Forest Reserves and use connecting habitats in the surrounding landscape. As chimpanzees are classed as endangered nationally and by the International Union for Conservation of Nature, they have a very high sensitivity to change.

Birds of conservation importance use habitats within the Wambabya Forest Reserve, papyrus swamps and other wetlands in the area of influence, and valleys throughout southern Uganda. Birds that are nationally and or globally rare and threatened include grey-crowned crane and hooded vulture.

The Kafu, Nabakazi, Katonga and Kibale Rivers are sensitive habitats for fish and aquatic macro-invertebrates (small animals without a backbone, but large enough to see with the naked eye). Rare or threatened fish and macro-invertebrates were not identified during baseline surveys but are likely to be present. Two migratory fish species were recorded.

Habitat loss and fragmentation is driving declines in many species of conservation importance and this trend is likely to continue with increased population pressure and use of natural resources.

Legally Protected, Internationally or Nationally Recognised Areas

The Wambabya and Taala Forest Reserves, as well as all rivers, are legally protected areas of high sensitivity that support plants and animals of conservation importance. The rivers crossed by the pipeline are the Wambabya tributary, the Kafu and two tributaries, the Nabakazi and two tributaries, the Katonga, Kibale and Jemakunya.



African golden cat caught on a camera trap during surveying

Physical Environment

Geology

The pipeline traverses very old, crystalline rocks of Precambrian age. These gneisses and granites are covered by about 30 m of weathered rock, although it varies in thickness, ranging from rock fragments near the bedrock to well-weathered soil and hardened laterite at the surface.

Uganda is prone to minor earthquakes associated with the East African Rift system. The proposed EACOP route does not traverse this system, but does cross six major faults.

Landslides and sinkholes have not been identified in the project area of influence.

Soil

The soil along most of the area of influence has a high sand content. The topsoil (the layer where most biological activity happens) is typically 20–30 centimetres deep, although in some areas it is likely to be less than 5 centimetres deep. The soil is mainly low to medium productivity, supporting grazing, commercial plantations and subsistence farming.

Most topsoil have low to medium organic matter content and high base status indicating that they could be productive if well managed. Continuing use of the land within the study area for agriculture and grazing is likely to cause a deterioration in soil quality.

Soil erosion risk varies across the area of influence, with greater risk on steeper slopes.

There is no evidence of soil contamination within the area of influence.

Surface Water

The pipeline area of influence includes permanent and seasonal watercourses and wetlands belonging to the Lake Albert, Victoria Nile and Lake Victoria basins.

The watercourses are stable, with floodplain swamp vegetation that limits flow speeds and inhibits erosion. The exception is the Jemakunya River, which has a relatively narrow zone of riparian vegetation along its channel, which increases the risk of instability.

Water quality is relatively good and is consistent with rivers in catchments with dispersed rural settlement, frequent use by livestock and people, and in which there is an abundance of swamp vegetation and high rates of biological activity. This means that it is sensitive to change. There are a few sources of contamination, mainly frequent use by livestock and by people for domestic purposes, which could cause an increase in organic compounds.

People use surface water mainly for their livestock and domestic purposes. Water use, including for irrigation, may increase as populations grow reducing flows downstream in areas where water may already be scarce.

Groundwater

Groundwater is the most important source for public supply in the water basins within the area of influence. Groundwater is used for drinking and domestic purposes, and is generally good quality.





LAND MODIFIED FOR AGRICULTURE

Groundwater bodies in the area of influence are recharged by rainfall and range from low to very high vulnerability depending on how easily water flows through the rock and depth to the water table.

Population growth is likely to increase the need for groundwater for domestic use. Groundwater is therefore considered highly sensitive to change.

Landscape

The pipeline route traverses a mixed landscape of gently undulating grasslands and farmland, hills with open plateaus and bare rocky outcrops, forest, wetlands and, near the border with Tanzania, a drier, more sparsely vegetated landscape. Most of the route has been modified by farming and grazing, and areas affected by the project are of low landscape sensitivity.

The landscape is able to tolerate further similar modification without changing its present character, so it is not regarded as sensitive to change.

Stakeholders did not see the proposed project as an intrusion in the landscape.

Air Quality

The air surveyed at the pumping station sites had relatively good quality because the area around these sites is sparsely populated with few sources of air emissions, although moderate to high levels of dust were detected. Emissions associated with the project will meet national and project environmental standards.

Noise

The noise in the area of influence, particularly around the aboveground installations, is dominated by human-induced sound from road traffic and farming activities, and by natural noises such as wind through vegetation and bird song.

There is no industrial and commercial noise throughout the area of influence.

Socio-economic and Health

The pipeline traverses 9 districts, 41 parishes, 22 subcounties and 4 town councils, and passes near an estimated 172 villages and hamlets. At the time of baseline data collection, these are the administrative areas that existed. However, a new district, Kikuube has since been gazetted and this will change the numbers quoted. The main livelihood is from agriculture and most settlements are concentrated along national and secondary roads. Settlements often have a central trading place.

The Baganda and Banyankole are the main ethnic groups found in the southern districts of the project area of influence. In the northern part, the main ethnic group is the Banyoro. The dominant religions are Christianity and Islam, often mixed with traditional beliefs.

The population is rapidly increasing, causing pressure on natural resources and social services. It is also young and highly mobile, and urbanisation is occurring in the districts in the project area of influence. Employment and business opportunities, and better infrastructure, are attracting rural migrants to the urban centres of Hoima, and Mbirizi and Kinoni in Lwengo district.

People are migrating to and from Uganda. Migration to Uganda has been driven by civil war and political instability in the Democratic Republic of Congo, Rwanda and South Sudan.

Adult literacy rates for people over 18 years old are 66–76% in the districts traversed by the project, with rates higher in men than women. School attendance rates are improving, although educational services face several challenges, including lack of trained teachers, equipment and buildings.



National Economy

East Africa is the fastest growing economic region in Africa with growth estimated at 6–7% for 2016 and 2017.

Uganda, as a member of the East African Community since 2010, shares a common market with Kenya, Tanzania, Burundi and Rwanda. Uganda's gross domestic product is approximately 60% of Kenya's (which is the largest economy in the East African Community), placing it behind Tanzania and just ahead of Rwanda. The East African Community is economically more diverse than other regional African communities because it is less dependent on extractive industries.

Uganda's economy collapsed during the 1970s and 1980s due to political uncertainty and ongoing civil war. Since then, the government has acted to rehabilitate the economy and economic reforms have ushered in a period of solid economic growth and lower inflation. Nevertheless, overall productivity remains hampered by supply-side constraints including underinvestment and high production costs in the agricultural sector.

The informal economy (activities, enterprises and jobs that are not taxed or regulated by the state, and offer little social protection to workers) accounts for approximately 45% of all economic activity.

The service industry contributes most to the formal economy with community services, and wholesale and retail trade being the most important sub-sectors, followed by transport and communication. Tourism is one of the fastest growing service sectors and is the largest foreign exchange earner. Agriculture has traditionally been a major economic activity but has decreased relative to other sectors, such as manufacturing, as they have grown.

The industrial sector is relatively small but has recorded high growth rates over the past three decades. However, this sector is dependent on imported equipment and energy (oil) and is impeded by poor infrastructure, high energy costs and low levels of private investment.

Local Economy

Although primary agriculture is the most important livelihood in the area of influence, the following economic activities are also important:

- small-scale processing of agricultural products
- small-scale trade in retail merchandise and agricultural produce
- provision of services including tourism and transport.

Land-based Livelihoods

Most farming activities are small-scale and characterised by low-input, low-output subsistence farming with trading of surplus crops. Crop production is predominantly rain fed as irrigation infrastructure is absent in most districts traversed by the project. Challenges faced by households engaged in crop farming include limited access to alternative sources of income, and lack of education, skills and experience.

Rearing animals including cattle, goats, sheep, poultry, pigs and donkeys is an important economic activity for many households. Key challenges include the prevalence of diseases and livestock theft. Localised nomadism, which involves movements of cattle between villages within and occasionally between districts, is common in the communities within the project area of influence and essential for the larger herds.

Small-scale mining in the area of influence focuses mainly on construction materials, such as sand, stone for aggregates and

laterite soils for brick making, and gold. Gold mining takes place in Kakumiro, Kyankwanzi and Mubende districts. However, it is difficult to determine the number of people involved, as the activities are informal and transient. Women involved in small-scale mining are considered very highly sensitive, as they have less access to productive capital than men and may be relying on mining as a sole livelihood. Children involved in mining are very highly sensitive, as they may be exposed to safety risks and may lack access to education.

Natural resources play a vital part in the subsistence of rural communities, providing energy for cooking, food security, construction materials for shelter, medicine and income. Key challenges for natural resource users include the high cost of alternative sources of energy for cooking and lighting, and pressure on natural resources from a growing population which is encroaching on wetlands and forest areas. Female firewood collectors and wild food users are deemed highly sensitive.

River, Lake and Marine-based Livelihoods

Lake fishing and fish farming are small-scale subsistence activities. Crop failure following droughts and floods is forcing farmers to fish as an alternative income source, which is increasing pressure on the fisheries sector. Young people are attracted to fishing as the size of farming plots decreases, rendering crop farming less profitable. Overfishing is decreasing fish stocks, which is encouraging the use of illegal fishing gear such as fine-meshed nets. This is a major challenge facing lake fisheries. Other major challenges for fisherfolk in the project

area of influence include low returns (owing to use of basic fishing techniques) and increased conversion of wetland areas for agricultural activities. Fish farming is affected by poor productivity and disease decreasing yields. Fisherfolk, who fish full time, particularly women, those people without land who fish on rivers and fish farm employees are very highly sensitive, as they have no or limited alternative opportunities to generate income.

Land and Property

The Land Act identifies four forms of land tenure: customary, leasehold, freehold and mailo. Over 60% of land is held under a customary tenure system, which applies to land areas that are governed by customary laws. This is mostly in the northern, western and southern parts of the country and in Hoima, Kakumiro and Kyankwanzi. Key problems associated with customary tenure include a lack of security for landowners and disadvantages for women.

The Land Act provides for two mechanisms by which rights held under customary tenure can be formally recognised. Any person, family or community holding land under customary tenure on former public land may acquire a certificate of customary ownership through a tiered application process. Applications are reviewed by the Area Land Committee and certificates are eventually issued by the district land board. The other mechanism is for a group of people to form a Communal Land Association for the communal ownership and management of land.

YOUNG PEOPLE ARE ATTRACTED TO FISHING AS THE SIZE OF FARMING PLOTS DECREASES, RENDERING CROP FARMING LESS PROFITABLE.



FISHING CATCH

ROUTE TO MARKET



THE SENSITIVITY OF THE WORKERS' HEALTH, SAFETY AND WELFARE IS RANKED AS VERY HIGH OWING TO THE LOCAL WORKFORCE'S GENERALLY LOW OCCUPATIONAL HEALTH AND SAFETY AWARENESS.

Freehold land tenure is governed by the Registration of Titles Act. Under this system, a registration of title in perpetuity and conferment of full powers of ownership is provided to the land holder, who may use the land for any legal purposes. Only national citizens are legally entitled to own land under the freehold system and there is little land held under freehold tenure.

With the mailo tenure system, land is registered under the Registration of Titles Act, which grants the holder a land title and absolute ownership in perpetuity. Approximately 23,300 km² of land is held under mailo tenure in Buganda (central Uganda) and Bunyoro (western Uganda). There are over 250,000 mailo land title holders in Uganda.

Land and property sensitivity is ranked as very high for female-headed households, who are particularly vulnerable due to long-standing discrimination that excludes women from owning, inheriting and controlling land. Households and individuals who have been previously displaced and resettled are also deemed very highly sensitive. Sensitivity is ranked as high for landholders without title deeds, as landholders will not be eligible for compensation without title deeds (only for crops grown). Youths are potentially highly sensitive, as they have limited access to land outside their customary rights.

Land conflicts form the highest percentage of reported disputes. Common concerns are landlord-tenant relations on mailo land, disputes over land expropriation by the Government and the implications of oil exploration and mining for local land tenure systems and rights.

Workers' Health, Safety and Welfare

Many companies in Uganda have little previous exposure to basic health and safety standards, and occupational health and safety is largely unregulated. Legislation on workers' rights and working conditions exists. However, in practice, workers are not always provided with adequate information on their terms of employment and labour rights, particularly those working in the informal economic sector. Baseline data revealed a low awareness level of health, safety and workers' rights.

The sensitivity of the workers' health, safety and welfare is ranked as very high owing to the local workforce's generally low occupational health and safety awareness.

Social Infrastructure and Services

Radio is the main means of receiving information, although mobile phones and the internet are becoming increasingly important for exchanging information. Rural electrification is still low, limiting general development.

Social infrastructure and services sensitivity is ranked as low for media, as all households have access to one or more media information sources. Potentially affected communities are ranked as moderately sensitive receptors for electricity, as most do not have access to the electricity grid and rely on other means for cooking and lighting. Households without mobile phones and internet access are ranked as moderately sensitive receptors, as they may not receive information shared through these media platforms.

Community Health

Most people living in the area of influence depend on the formal health care system as well as traditional medicine. This is attributed to ongoing health education and system strengthening including provision of outreach services. Use of traditional medicine has generally decreased as more people embrace modern healthcare.

There is a nationwide increase in non-communicable diseases (those which are not caused by infectious agents), particularly hypertension, heart disease and diabetes, which has been linked to urbanisation and associated lifestyle changes. Chronic (long-standing) malnutrition rates have decreased at district level while acute (intense) malnutrition rates have generally remained low and stable at community population level.

There has been a decrease in the burden of diarrhoeal diseases. This is partly attributed to improvements in hygiene behaviour, with access to safe drinking water and basic sanitation facilities improving. The potential for cholera, dysentery and typhoid outbreaks remains high in all parts of the area of influence because of underlying challenges in environmental health conditions.

A decrease in human immunodeficiency virus (HIV) prevalence over the past three years was reported in the area of influence and attributed to health education, free condom distribution, increased HIV testing, care and treatment, and a reduction in HIV stigma.

Infectious diseases that can be spread between animals and people remain a risk, particularly those related to people and animals moving into an area. Key to controlling diseases carried by animals, such as malaria, are environmental sanitation, health care services and preventative treatments, and programmes to control animal movements and migration of people.

Community health sensitivity is ranked as potentially high for children, the elderly, pregnant women, people living in crowded

areas, those with decreased access to appropriate healthcare facilities, people with poor access to clean water, women headed households, sex workers and those living near to small-scale mine sites, transport routes and access roads. Sensitivity is ranked as potentially very high for people with compromised immune systems.

Community Safety, Security and Welfare

Villages have established an effective mechanism for conflict resolution and support groups. Although potentially affected communities are generally peaceful, conflicts arise in relation to changing demographics and decentralisation, underlining the requirement for effective stakeholder engagement. There are vulnerable groups, including widow-headed households, children and people with ill health or living with a chronic illness, which will need special consideration.

The sensitivity of women in relation to community safety, security and welfare is ranked as very high, as cultural attitudes towards them and their role within the household hinder many women from engaging in income-generating activities and decision-making processes. Widow-headed households, the elderly and the disabled are ranked as very highly sensitive because meeting basic household needs and affording healthcare can be difficult for them. Children are ranked as very highly sensitive, particularly those from poor households and orphans with acquired immune deficiency syndrome (AIDS), and boys from cattle keeping and plantation agriculture communities. Youths are also ranked as very highly sensitive owing to their limited access to productive assets, lack of education and vocational skills, and scarce employment opportunities. People living with illnesses are ranked as very highly sensitive, as they rely on others for financial and food security. Land users without land titles are also deemed very highly sensitive because they will not be eligible for compensation without formal acknowledgement of land ownership (only for crops grown).



Traffic

Roads in Uganda vary in condition and can have sealed and unsealed surfaces. The use of the roads by pedestrians is common in most rural areas, as there are few pavements. Cyclists and boda boda (small motorbikes) use the roads extensively, particularly in urban areas, and the risk of accidents involving pedestrians, cyclists and boda boda is considered high.

Traffic levels are low in the area of influence, so congestion is rare, except at the border with Tanzania and in Kampala. Some congestion can be experienced in Hoima Municipality and Mutukula Town (on the border with Tanzania).

Many of the unsealed roads in the project area are being upgraded and new roads are being constructed by the Uganda National Roads Authority to support oil and gas infrastructure development.

Cultural Heritage

Tangible cultural heritage is defined as objects, sites or structures with archaeological, palaeontological, historical, cultural, artistic and religious value. Intangible cultural heritage is defined as cultural resources, knowledge, innovations and practices of local communities embodying traditional lifestyles.

The tangible and intangible cultural heritage identified in the area of influence is a representative sample and more features are likely to be identified by surveys and further consultations with local communities before and during construction.

There are no known nationally or internationally recognised critical cultural heritage sites, as defined by the International Finance Corporation, within the area of influence.

Archaeological sites have been identified, including those associated with pottery, stone tools, rock-art and evidence of iron working.

Religious structures are the most common cultural heritage with a physical location and a strong intangible sensitivity, including four churches within 100 m of the project footprint, and three cemeteries, two of which are within the project footprint and a third within 100 m.

Intangible cultural heritage is closely linked to individual and group identity and therefore sensitive to cultural change. Examples of this type of heritage include sacred natural sites and trees, traditional dances, ritual involving the ancestors, traditional healing and medicine, meeting places and sacred rivers.

Climate

Since 1960, mean annual temperatures have risen by 1.3°C and annual and seasonal rainfall has decreased considerably across Uganda. Rainfall has also become more unpredictable and evenly distributed over the year.

Uganda is vulnerable to increased climate variability and climate change. For example, the severity and frequency of extreme events such as droughts and floods is projected to increase.



RURAL ROAD



Global anthropogenic greenhouse-gas emissions, with other anthropogenic drivers, are extremely likely to have been the dominant cause of the observed warming of the global climate since the mid-20th century. Between 1990 and 2014, Uganda's greenhouse-gas emissions increased by 71%. However, Uganda has one of the lowest levels of greenhouse gas emissions in the world, estimated at 1.6 tons of carbon dioxide equivalent per person for 2014, totalling absolute emissions of 59.9 million tons of carbon dioxide equivalent, which is approximately 0.12% of the world total.

Ecosystem Services

Biodiversity

Protected areas and habitats of conservation importance enable people to collect wood for charcoal production and building, timber and other wood fibres for fuel, plants for food and medicinal purposes, and fibres, resins and other materials. These areas also help to control water flow, the rate of soil erosion, local air quality and local climate. They provide cultural functions too such as sense of place and way of life; spiritual, sacred and religious values; inspiration for culture, art and design; and opportunities to learn. The habitats also provide important refuge, feeding, watering, breeding and nursery areas for land- and water-based wildlife. Certain protected areas are vital for wildlife tourism.

Plants and animals of conservation importance provide services to people such as wild food via hunting, fishing and foraging of plants for personal use or trade. Predatory birds and large mammals provide pest control and regulate living systems, while certain animals, particularly large mammals and their associated habitats, can be vital for wildlife tourism. Plants and animals, and their habitats, can also inspire culture, art and design, and create opportunities for learning.

Physical Environment

The condition of the soil can control its erosion and soil can provide aggregate for construction.

Rivers and lakes provide water for local people in rural communities and their livestock. People collect water for domestic purposes and small-scale subsistence agriculture. The watercourses and associated floodplains also help to control floods by slowing water, storing it on floodplains, and transmitting it relatively slowly downstream to reduce peak flows. Watercourses also help to regulate water quality, particularly where they are vegetated.

Groundwater is an important supply of freshwater for community use. It also plays an important supporting role for water-based and riverbank habitats and wildlife.

People can benefit from a sense of wellbeing from living in an attractive landscape. Stakeholders did not perceive the proposed project infrastructure as a negative visual intrusion in the landscape.

Socio-economic and Health

The Ugandan economy is heavily dependent on agriculture, forestry, fishing, mining and tourism.

The local economy relies on land-based livelihoods. Crop farming is vital, sometimes providing communities with their only source of food. Livestock rearing is also important, primarily as mitigation against shock events. Land is a vital resource for livestock keeping, grazing, water sources, and it enables the growth of trees for shelter and medicinal herbs. Natural resources such as fuel (firewood and charcoal), wild foods (honeys, insects, mushrooms and bush meat), timber, medicinal plants and grasses are also valuable in terms of providing energy for cooking, construction materials, traditional medicine



and income. Small-scale mining, which is undertaken primarily in the dry season, also supports people. Fishing provides food and income and has long-standing cultural importance, particularly for the lake fisherfolk. Safe water plays an important role in the general health and livelihood activities.

Cultural Heritage

Cultural heritage provides knowledge for understanding the natural environment and ecosystems. It influences social systems and social relations and offers a sense of place in a complex and changing world. Cultural heritage also helps control the use of land, the resolution of conflicts and the day-to-day performance of the social duties that make local society work.

Stakeholder Engagement

Stakeholder engagement is an integral part of the EACOP project and the ESIA process. It is the foundation for developing and maintaining the project’s social licence to construct and operate the pipeline. Stakeholder engagement has been undertaken in accordance with the requirements of Ugandan legislation, international standards and EACOP project principles, protocols and policies for stakeholder engagement.

Stakeholders engaged included government, civil society, and directly and indirectly affected people and communities, with attention paid to the needs of women and those people who are vulnerable to the potential impacts. It also considered human rights.

The stakeholder engagement process has been tailored to meet the needs of the EACOP project, ESIA process and stakeholders. The plan has been to provide effective engagement throughout the ESIA process based on:

- a stakeholder identification and analysis process
- methods, materials and protocols for stakeholder engagement, including information disclosure, consultation and reporting to stakeholders
- the ESIA stakeholder engagement activities
- a data management system for all stakeholder data and minutes of meetings for analysis and follow up
- a project grievance procedure, which also serves as the ESIA grievance procedure.

Stakeholder engagement was conducted during the scoping phase, the baseline and impact assessment phase and pre-ESIA submission to fulfil the objectives, which included:

- obtaining an understanding of the number and types of stakeholders in the socio-economic study area



- informing stakeholders about the ESIA baseline studies in the areas traversed by the project and associated infrastructure
- obtaining stakeholder input into the scope of the ESIA, including the development of the understanding of features deemed to be of value by society, impact identification, mitigation measures and potential sources of cumulative impact and impact mitigation
- listening to questions and concerns from stakeholders and ensuring that these are addressed in the ESIA
- conducting pre-submission meetings to consult a sample of potentially impacted local stakeholders, before the submission to the National Environment Management Authority to acquire its feedback on ESIA findings (impacts and mitigation measures), cumulative impact assessment and mitigation measures.

The engagement provided stakeholders with information about the project and the ESIA, including the engagement and grievance management processes. It also provides a mechanism for ongoing stakeholder engagement.

Stakeholder Concerns

The stakeholder concerns raised and how the project intends to address them are summarised below.

Socio-economic and Health

Most stakeholder concerns related to socio-economic and health matters.

Stakeholders raised concerns over land acquisition and compensation for loss of land, livelihoods and properties. The difficulty of finding and acquiring replacement land, the timing of compensation and compensation needs for land-owners and tenants were also raised. There were also concerns about forced resettlement, choice of host area and livelihood restoration, and clarifications were sought about the project right-of-way.

Stakeholders were informed that the project will manage land acquisition by developing resettlement-action and livelihood-restoration plans, and that compensation will be provided in accordance with national law and international standards before construction begins. It was explained that a permanent 30-m-wide right-of-way would be needed during construction and operation.

Concerns were raised about the impacts of people attracted to the area by potential project-related opportunities (in-migration) and how this potential influx would be managed. Stakeholders were informed that an in-migration management plan will be developed and implemented with the objective of reducing the number of people that come to the potentially affected communities for either direct or indirect project opportunities.

Stakeholders were interested in employment and procurement opportunities for local people, particularly for women and youths. In response, stakeholders were informed that a



transparent recruitment strategy would be developed and shared with communities. They were also told about the local content plan developed to maximise the purchase of goods and services from within Uganda, and the procurement and supply chain management plan which reinforces the use of local workers and suppliers.

Community health and safety concerns were raised, with questions asked about the potential health impacts of the project, including the spread of communicable diseases, road safety, and potential impacts on water quality and of dust generation. In response, information was provided about the health and traffic impact assessments included in the ESIA, the community health, safety and security plan containing the appropriate mitigation, and the pollution prevention plan including dust suppression measures. Stakeholders were also advised that water quality will be monitored regularly and alternative community water sources will be provided where construction restricts access to water sources. It was noted that the project construction workforce would be accommodated in camps with health and recreational facilities to avoid impacts on local health and other public infrastructure, and that camps would be closed and interactions with local communities discouraged.

Physical Environment

Stakeholders raised concerns that heat from the pipeline would affect soil productivity and effect community water sources. The stakeholder engagement team explained that the pipe would be insulated and heat from the pipeline would not affect soils or crop productivity. The team informed stakeholders of the pollution prevention plan, which includes measures to limit impacts on water sources.

Concerns were also raised about potential project impacts on air quality and climate change. The stakeholder engagement team explained that the project engineering team will ensure compliance with applicable emission standards.

Biodiversity

Stakeholders raised concerns about the potential impact of the project on the Lake Albert fisheries and biodiversity in the project area, including impacts on sensitive natural systems, the interconnectivity of habitats for migratory and native animals and loss of vegetation and animals. Stakeholders were informed that the selection of the pipeline route considered the need to avoid environmentally and socially sensitive areas, and that the pipeline will be constructed along existing infrastructure corridors where feasible. They were also informed of the biodiversity management plans and the project aim to cause no overall loss of plant and animal diversity.

Project and ESIA-Related Matters (Including Stakeholder Engagement)

Questions were asked about the ESIA, the definition of the area of influence and the grievance mechanism. Stakeholders also requested information about pipeline routing and project design. The stakeholder engagement team informed stakeholders about the ESIA process and how grievances will be handled at various levels within the grievance mechanism. Feedback was also provided on the project design including pipeline routing, emphasising that the route would only be finalised once all the studies, and oil-spill-contingency, emergency-response and security planning were completed.

Grievance Mechanism

The EACOP project has established a nonjudicial grievance mechanism to respond to stakeholders' concerns and to facilitate resolution of stakeholders' grievances. This mechanism is compliant with the United Nations Guiding Principles on Business and Human Rights effectiveness criteria for project-level grievance mechanisms.

The grievance mechanism describes the process available to stakeholders for lodging a grievance during pre-construction, construction and project operations, and is accessible to all stakeholders at no cost and without retribution. Judicial and administrative options can also be pursued by stakeholders.

The project's grievance mechanism has been presented to stakeholders during each consultation phase and is managed by the EACOP project's community liaison officers and grievance administrators.

Ongoing Stakeholder Engagement

Stakeholder engagement will continue after the ESIA report has been submitted to the regulators. This engagement will focus on key stakeholders identified during the scoping and baseline phases. The government environmental impact statement disclosure will be conducted in concordance with the National Environmental Act (1998).

Following the ESIA disclosure phase, the project stakeholder engagement team will continue to engage with key stakeholders at national, regional and local level throughout the project life cycle to further discuss the results of the ESIA and how stakeholder concerns have been considered in the ESIA. The engagement strategy will also include targeted engagement with identified vulnerable stakeholders or their representatives.

Engagement activities will be adjusted to reflect evolving project activities, stakeholder preferences and concerns over the project life. The project will also seek to build partnerships with nongovernmental organisations, community liaison officers and communities to support the development and implementation of practical impact management strategies.

During the construction phase of the EACOP project, local community offices will be established at locations along the route to provide stakeholders direct access to community relation coordinators, community liaison officers and grievance officers.

The resettlement action plan team will continue stakeholder engagement throughout the resettlement process.

The grievance mechanism will continue to provide opportunities for stakeholders and potentially affected communities to express grievances about project activities.

A stakeholder engagement monitoring and evaluation programme will be developed to ensure efficient and effective stakeholder engagement. This will run in parallel with community awareness programmes.

Impacts – Normal Operations

A primary project objective is to design, construct, operate and decommission the pipeline and its aboveground installations with minimal risk, injury or harm to workers, host communities and the environment that support these people.

Potential impacts on biodiversity, the physical environment, people's socio-economic and health status, archaeology and cultural heritage during the construction and operation phases were considered during the ESIA.

The following section presents the significant residual impacts remaining after proposed mitigation is applied, and the procedure for decommissioning. Beneficial project impacts are also described. All potentially significant ecosystem services related impacts are addressed by the impact assessments for each valued feature and the associated management plans.



LOCAL ECONOMIC ACTIVITY

Beneficial Impacts

Potential project impacts, predominantly relating to socio-economic factors will be beneficial, including:

- contribution to the national economy from investment
- generation of national and local employment opportunities
- provision of training and skill development opportunities
- opportunities for national and local businesses through project procurement
- improvement in the health and safety of employees from disease awareness and reduction programmes
- increased knowledge and recording of tangible and intangible cultural heritage.

Where possible, enhancement measures will be implemented to increase the benefits to local people, and the local and national economy.

Potential Negative Impacts

The impact assessment process included the mitigation of potential pipeline impacts identified for each valued feature. Potential impacts include those shown in Table 1. The potential impact of the project on climate change has also been assessed.

TABLE 1: Potential impacts

BIODIVERSITY
Permanent loss of habitat from operational right-of-way
Project-induced migration into areas around the main camps and pipe yards causing increased pressure on natural resources
Stress or mortality to flora and fauna
Loss of chimpanzee habitat and disturbance to chimpanzees
Reduced primary productivity in watercourses
Temporary or permanent loss of breeding and foraging habitat
Modified habitats owing to non-native species establishment
Loss of ecological function and integrity of protected sites
PHYSICAL ENVIRONMENT
Loss of soil structure, drainage, fertility and seed bank
Soil contamination
Contamination of surface and groundwater
Deterioration in water quality
Decreased water level owing to abstraction for project use
Reduced air quality from combustion of fuel in construction equipment and vehicles
Disturbance or nuisance from construction noise along the right-of-way and from traffic movement

SOCIO-ECONOMIC AND HEALTH

Dissatisfaction arising from unmet expectations over the scale and duration of local employment opportunities associated with the project
Competition over employment opportunities
Inflation and effects on supply owing to project procurement
Increased transportation costs and travel time with economic consequences
Permanent loss of land used for crop farming and grazing
Permanent loss of natural resources
Temporary loss of access to fishing grounds (rivers, Lake Albert, dams and ponds)
Permanent loss of private land owing to project land acquisition
Land and property speculation by land owners and third parties
Increased risk of vector-related diseases amongst the local workforce
Traffic congestion leading to delays
Increased pressure on regional waste management facilities owing to project activities
An increase in the burden of disease along the project's transport corridors caused by drivers spreading communicable diseases
Nutrition of project-affected communities compromised by reduced food security
Community health and safety incidents associated with accidents during construction
Change in local community dynamics owing to employment opportunities
Damage, disturbance or disruption of access to cultural heritage

Transboundary Impacts

There are no significant residual transboundary impacts identified.

Cumulative Impacts

Hoima Municipality is likely to experience a general economic boost due to the beneficial cumulative impacts from employment, training and purchasing associated with the EACOP project, the associated Tilenga and Kingfisher facilities, and third-party developments.

The upgrade of the EACOP project access roads and the third-party road upgrades is also a long-term beneficial cumulative impact, which will enhance access to the national road network and thus provide easier access to health care and reduce travel times including response times in emergency situations.

After mitigation measures have been implemented, one potential cumulative impact remains significant. The EACOP project, associated facilities and third-party developments will change the characteristic rural quality of the landscape for people around the first pumping station. However, the contribution from the EACOP project and associated facilities to this change in character will be small.

The EACOP-project and associated-facility teams will collaborate in regional cumulative environmental management initiatives with operators of current projects, developers of proposed projects and the Government. It is envisaged that initiative management priorities would be defined for implementation by industry participants.

Enhancement and conservation measures that will be developed and implemented through the production of a site-specific biodiversity action plan and support for ongoing joint forest conservation initiatives will reduce the project impact on chimpanzee habitat and reduce the potential cumulative impacts from associated facilities and third-party projects.

DURING THE IMPACT ASSESSMENT, MEASURES WERE PROPOSED TO MITIGATE POTENTIAL PROJECT IMPACTS.

THE PROJECT HAS ADOPTED ENGINEERING DESIGN CRITERIA TO REDUCE THE PROBABILITY AND CONSEQUENCES OF UNPLANNED EVENTS THAT COULD LEAD TO IMPACTS ON SOCIAL OR ENVIRONMENTAL FEATURES.

Associated Facilities

The Tilenga and Kingfisher Oil projects, and some concrete batch plants, borrow-pits and waste management facilities have been identified as associated facilities (following the International Finance Corporation's definition). The locations of concrete batch plants, borrow-pits and waste disposal sites have yet to be defined and will be subject to a management-of-change process.

The beneficial impacts of the Tilenga and Kingfisher Oil projects are similar to those associated with the EACOP project, for example, increased economic growth and employment opportunities, and improved health planning.

The Tilenga and Kingfisher Oil projects have significant residual impacts on biodiversity and society, particularly impacts relating to project-induced in-migration, and impacts on surface water, the noise environment and the landscape character. The Tilenga feeder pipeline is part of the Tilenga project and has a separate ESIA. However, there are no significant residual impacts from the Tilenga feeder pipeline.

Potential Impacts – Unplanned Events

Unplanned events considered include:

- traffic accidents
- fires
- damage to third-party assets
- release of diesel from fuel storage tanks at the main camps and pipe yards, and construction sites
- release of water used for hydrotesting during pipeline commissioning
- oil spills
- sabotage
- geophysical hazards.

The project has adopted engineering design criteria that aim to reduce the probability and consequences of unplanned events that could lead to impacts to social or environmental receptors. At each stage of the design process, a series of health, safety and environmental studies has been, and will continue to be, undertaken.

The project has completed a technological risk assessment during the front-end engineering design work in accordance with the EACOP project health, safety and environmental risk assessment methodology.

Risk assessment has been undertaken to inform the design and ESIA processes, and the development of mitigation measures. Additional risk assessment will be undertaken during detailed engineering and construction planning.

An emergency response plan will be prepared which clearly identifies possible emergency scenarios, sets out actions to be taken in the event of an emergency, and defines resources that will be made available to respond to an emergency event.

It will include management plans and procedures, such as an oil spill contingency plan, spill management and response plan, and a community health, safety and security plan.

Work has been undertaken that supports the establishment of a preliminary rating of the risks and related significance, based on existing engineering knowledge and project design, and professional judgement.

The project will reduce risk through:

- design and construction mitigation
- health, safety, security, society and environment (H3SE) systems and procedures
- emergency response planning.

Throughout the design process, opportunities to reduce risk during construction and operation have been considered. During construction contractors will be required to comply with a health, safety and environmental management system.

During the operation phase, the unplanned loss of oil from the pipeline, whether due to geophysical hazards, deliberate sabotage, corrosion or for any other reason, is the main significant risk. Oil spill modelling has been conducted for the pipeline to consider the risks associated with oil loss during operation.

Decommissioning

The project components (the pipeline and pumping stations), will be decommissioned based on Ugandan regulations and standards and international standards and protocols.

The decommissioning plan for the construction facilities will ensure that all the project components that were required for constructing the pipeline, but that will no longer be required during the operational phase, are removed and land returned to the Government. The decommissioning plan will include specific consideration of unplanned events which may occur during decommissioning in line with the EACOP project requirements.

Environmental and Social Impact Management and Monitoring Plans

In accordance with the Environmental Impact Assessment Guidelines for the Energy Sector in Uganda, 2004, and the Environmental and Social Impact Assessment Guidelines for the Energy Sector in Uganda, 2014, an environmental and social management plan has been developed.

The project environmental and social management plan is consistent with the EACOP project code of conduct and the health, safety, security, society and environment policy.

The environmental and social monitoring plan contains monitoring parameters, proposed performance indicators and targets that will steer environment and social performance toward continuous improvement. A comprehensive reporting system will also be developed.



Management plans will be prepared to support the implementation of the environmental and social management, and the environmental and social monitoring plans. These plans will contain, as a minimum, the mitigation commitments developed throughout the ESIA and will be prepared for construction and operation.

The following is a list of the management plans that will be developed before construction and operation activities start.

Terrestrial management plans include the:

- biodiversity management plan
- pollution prevention plan
- waste management plan
- natural resource management plan
- soil management plan
- cultural heritage management plan
- reinstatement plan
- stakeholder engagement plan
- resettlement action plan
- labour management plan
- project induced in-migration management plan
- procurement and supply chain management plan
- infrastructure and utilities management plan
- community health, safety and security plan
- occupational health, safety and security plan
- transport and road safety management plan
- emergency preparedness and response plan
- monitoring and reporting plan
- decommissioning plan.

Changes to the project may occur after the preparation and submission of the ESIA. A procedure to manage the changes will be implemented that includes:

- environmental and social appraisal of the change, including the identification of new or revised mitigation measures
- health and safety evaluation

- consultation with engineering and health, safety, security, society and environment disciplines
- consultation with the National Environment Management Authority on the need for amendments to the ESIA permit
- management of change approval process.

After management of change approval, changes to the environmental and social management and monitoring plans and supporting management plans will be implemented.

Recommendations

The ESIA has been prepared by an experienced team with extensive pipeline engineering, environmental and social impact assessment knowledge, including Ugandan partners with expertise in ESIA development in the Ugandan oil and gas sector. The team has quantitatively and qualitatively identified and assessed potential interactions between the project and environmental and social features considered important by society in the project area of influence. The recommended measures, consolidated in the environmental and social management plan, which are either incorporated into project design, or completed during project implementation, are intended to mitigate the impacts and their significance.

The EACOP project, with due consideration to the management of associated environmental and social impacts, will:

- contribute to economy
- provide business opportunities for different sectors of the economy and enhance capacities of local companies
- provide employment, knowledge transfer and skills development opportunities during construction and operation.

As these are benefits in the public interest, it is requested that the National Environment Management Authority approve this environmental impact statement.